Revisions

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<tr>
<td>June 2016</td>
<td>Initial draft</td>
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Acknowledgements

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Executive summary

This document describes Dell™ FluidFS monitoring capabilities and provides fundamental knowledge and use cases for monitoring Dell FluidFS.

This document does not provide step-by-step procedures for recommended configurations, which are described in other documents referenced throughout this paper.

In general, the reader is encouraged to use this document in conjunction with the FluidFS Administrator’s Guide (available on Dell.com/support), which includes more detailed descriptions of FluidFS features and configuration procedures.

Audience

This document is intended for system, network, or storage administrators and integrators who plan to use and monitor Dell Fluid File System.

It is assumed throughout the document that the reader is familiar with the Dell FluidFS network-attached storage platform functionality, features, installation, user interface, and operation.
1 Introduction

FluidFS is an enterprise-class, fully distributed file system that provides the tools necessary to manage file data in an efficient and simple manner. The underlying software architecture leverages a symmetric clustering model with distributed metadata, native load balancing, advanced caching capabilities, and a rich set of features. FluidFS removes the scalability limitations such as limited volume size associated with traditional file systems, and supports high capacity, performance-intensive workloads by scaling up with additional capacity, and by scaling out with additional controllers to increase system performance.

The Dell FS8600 scale-out NAS consists of one to four FS8600 appliances configured as a FluidFS cluster. Each NAS appliance is a rack-mounted 2U chassis that contains two hot-swappable NAS controllers in an active-active configuration. In a NAS appliance, the second NAS controller that has one paired NAS controller is called the peer controller. The FS8600 scale-out NAS supports expansion; NAS appliances can be added to the FluidFS cluster as needed to increase performance.

The FS8600 shares a back-end infrastructure with SC Series storage. The SAN network connects the FS8600 to the SC array and carries the block-level traffic. The FS8600 communicates with the SC array using either iSCSI or Fibre Channel protocol, depending on the NAS appliance configuration purchased.
2 FluidFS monitoring
Monitoring Dell FluidFS helps storage administrators keep track of system and user needs. With Dell FluidFS, the system hardware and software can be monitored, and thresholds alerts can be set to trigger events, which can be sent by email and also shown in the event tabs of Dell Storage Manager (DSM).

In addition to monitoring events, activities of connected sessions can be monitored. This feature allows monitoring of client connections, active sessions, open files, and also provides the ability to rebalance or move connections.

2.1 FluidFS events
In Dell FluidFS, every system operation is logged and presented in a centralized event viewer, instead of provided in large log files.

In addition, FluidFS can be integrated with SNMP monitoring systems using the FluidFS Management Information Base (MIB). Find more information on SNMP monitoring in the document, Monitoring FluidFS using SolarWinds Network Performance Monitor.

To monitor a Dell FluidFS cluster in normal operation, or when an issue occurs, the system events tab in DSM is used. There are several built-in timeframe event views such as Last Day, Last 3 Days, Last 5 Days, Last Week, and Last Month. A complete customized timeframe view is also available.
In the events tab, the reporting functionality is used to save all the events to several formats (CTRL+S).

2.1.1 Setting email to receive events

To receive system events by email, configure the following components:

- Mail relay
- Users to receive the event emails
- Events severity to sent

To configure mail relay:

1. In Dell Storage Manager, click the FluidFS cluster.
2. Click the FluidFS tab and click maintenance.
3. Click Mail & Administrators and click modify mail settings.
Mail and the authentication to the mail server can be configured, as well as the frequency of events sent by Dell FluidFS.

To configure the severity level of events to send email, right-click the administrator user (which can be configured as Active Directory user), and click **Modify Send Mail Severity**.

### 2.1.2 Setting threshold alerts

Dell FluidFS provides the ability to set up threshold alerts for various FluidFS components. Using the threshold alert feature helps in managing storage provisioning and future storage purchase decisions.

The following list shows FluidFS components that can be set up with threshold alerts:

- NAS pool
- NAS volume
- Snapshots space
2.1.3 Setting NAS pool threshold alerts
Alerts can be enabled or disabled when a specific NAS pool storage percentage is used. By default, the alert is enabled and set at 90 percent. In addition, alerts are sent if unused space is below 10GB.

To modify the NAS pool threshold setting:
1. In DSM, click the FluidFS cluster.
2. Click the Summary tab and click Edit NAS Pool Settings.

2.1.4 Setting NAS volume and snapshot threshold alerts
In Dell FluidFS, NAS volumes are thin provisioned by default and the volume can be changed from thin to thick. In a thin-provisioned volume, FluidFS does not use all allocated space at the creation of the volume.

Setting up NAS volume threshold alerts requires an understanding of FluidFS terminology in regards to NAS volumes.

- **Volume size**: While the volume can shrink or grow, the volume size is the maximum size of the volume.
- **Used space**: Actual used space from user data and snapshots.
- **Reserved space**: A portion of a thin-provisioned NAS volume that is dedicated to the NAS volume. No other volumes can use this space.
- **Unreserved space**: A portion of a thin-provisioned NAS volume that is not reserved. Other volumes can take the space. The calculation of unreserved space is: NAS volume size - NAS volume reserve space.
- **Unused space**: Storage space currently available. The calculation of unused space is: Unused NAS volume reserved space + NAS volume reserved space.
- **Snapshot space**: Storage space used by snapshots of the volume.
- **Data reduction savings**: Storage space reclaimed by the reduction process.
Threshold alerts can be configured for the following:

- **Used space**: Enabled by default and set to 90 percent, an alert will trigger when used space is over 90 percent.
- **Unused space**: An alert will trigger when unused space is below the threshold.
- **Snapshot space**: An alert will trigger when snapshot space is over the threshold.

To configure these threshold alerts:

1. In DSM, click the FluidFS cluster.
2. Click the File System tab and right-click the desired volume.
3. Click Edit settings and click Space.

The volume summary window displays the current volume settings:
2.1.5 Monitoring user quotas

Quotas for users, groups, and directories can be monitored by enabling a soft quota that generates an event when capacity is exceeded.

In addition, quota usage can be monitored by clicking the desired volume and clicking the Quota tab.

To monitor group quota usage, click the desired volume, click the Quota tab, and scroll to Group Quota Usage.

To monitor directory quota usage, click the desired volume, click the Quota tab, and scroll to Directory Quota Rules.
3 Client activity monitoring

Dell FluidFS enables monitoring of connected client activity such as the session connected to the cluster, open files in use, and clients connected.

3.1 Session monitoring

Active NFS and SMB sessions connected to Dell FluidFS cluster can be monitored.

To monitor active sessions using DSM:

1. Click the FluidFS cluster.
2. Click File System.
3. Click the Client Activity icon.
4. Click the Sessions tab.

For each client session, it is possible to view and filter information such as the IPs and users connected, the protocol and controller used, the number of open files, and session time including idle time.

The filtering option provides more flexibility when it comes to identifying specific session information. For example, to filter SMB users with session idle times greater than 24 hours, use the session display filter.
3.2 Open files monitoring

Dell FluidFS provides the ability to monitor and filter open files, and also close open files if needed. In DSM, it is possible to view up to 1,000 open files or filter the list of open files per file name, user, and protocol.

The selected file can be closed using three different methods: Close an individual selected file, close all files by a specific path, or close all files by a specific user.

**Note:** Exercise caution when closing files. It is recommended to use this option only as last resort since applications may be affected by an abrupt disconnection to the file.

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3.3 SACL auditing events

FluidFS provides the option to audit file system usage and activity. There are two ways to monitor these activity: Native SACL auditing and Dell Change Auditor.

For more information about these options, see the document, [Auditing User File Activity on FluidFS Version 5](#).
3.4 **Client monitoring**

In addition to session monitoring, the client connection to the cluster can be monitored. In contrast to session monitoring, client monitoring allows specific information about the client connection to be viewed, such as to which interface in the controller the client is connected to. It is also possible to pin a client for a specific controller.

The tasks available from this view include: Failback Clients, Rebalance Clients, Move Client to NAS Controller, and Pin Client to NAS controller.
4 Hardware monitoring

DSM provides a graphical view for the Dell FluidFS appliance hardware. In the event of hardware component failure, the component is marked in red in the graphical view and an event is issued.

4.1 Hardware component monitoring

Dell FluidFS allows monitoring of the following appliance hardware:

- Appliance controllers
- Appliance fans
- Appliance power supply
- Controller interface
- Controller local disk
- Controller internal battery supply
4.1.1 Appliance hardware monitoring

It is critical to monitor the appliance hardware because hardware failure can cause an interruption to filesystem services.

To monitor the appliance hardware in DSM, the hardware tab provides a view of the appliance itself. It displays the appliance front and rear views, and in the event of a component failure, the controller and the component are highlighted in red.

In addition to the appliance view, it is possible to monitor the internal fans which are located in the front of the appliance (viewable in the front view sub tab).

Click the Fans icon to monitor all six internal fans and see if the environment in the data center is optimal for the appliance. If temperatures are higher than normal, the RPMs of the fans will be higher.
Lastly, DSM allows monitoring the status of the power supply to the appliance by clicking the power supply icon, if one of the power connections fails, the power supply changes from optimal to fail and an event is generated.

4.1.2 Controller hardware monitoring

In addition to the Dell FluidFS appliance, each controller and its hardware components can be monitored. The controller components available for monitoring through DSM include internal interfaces, local disks, and the internal backup power supply.

Viewing the controller interfaces provides information about the controller internal NICs, HBAs, and the internal appliance backplane.

The interfaces screen provides information about four categories:

- **Client interfaces**: Client NICs connected to the front-end switch
- **Backplane interfaces**: Internal PLX controller which connects both controllers and provides internal controller communication and redundancy
- **Internal interfaces**: Internal NICs used for internal cluster communication
- **SAN interfaces**: Internal HBA connected to the back-end storage
- **Administrative interfaces**: Management network used for administrative use
Dell FluidFS uses internal drives for storing its operating system, and in critical situations, storage for cache dumps. Click the disk icon to monitor the information about the local disk.

The backup power supply is an important component used to protect the file system cache in case of a power failure. In case of battery failure or non-optimal status, contact Dell Support.
5 Performance monitoring

DSM is used to monitor the FluidFS cluster performance. The following performance charts are available in Dell FluidFS:

- Total cluster throughput
- SMB read/write throughput and IOPS
- NFS read/write throughput and IOPS
- Replication read/write throughput
- NDMP read/write throughput

The Performance tab displays statistics for different timeframes such as Last Day, Last Week, Last Month, and Last Year.
In addition, DSM can display information about load balancing for the NAS controller which includes the processor utilization and the number of connections to the cluster. These statistics are presented per NAS controller and not for the entire cluster.
## Technical support and resources

[Dell.com/support](https://www.dell.com) is focused on meeting customer needs with proven services and support.

For additional support information on specific array models, see the following table.

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<th>Dell Storage</th>
<th>Online support</th>
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<td><a href="https://customer.compellent.com">https://customer.compellent.com</a></td>
<td><a href="mailto:support@compellent.com">support@compellent.com</a></td>
<td>866-EZ-STORE (866-397-8673)</td>
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[Dell TechCenter](https://www.dell.com) is an online technical community where IT professionals have access to numerous resources for Dell software, hardware and services.

[Storage Solutions Technical Documents](https://www.dell.com) on Dell TechCenter provide expertise that helps to ensure customer success on Dell Storage platforms.